SECTION D:

TRAIL DESIGN STANDARDS FOR SUGAR LAND

CHAPTER CONTENTS

- Trail Types for Sugar Land
- Trail Design Standards
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Trail Types for Sugar Land

Trails appeal to everyone. Whether young or old, active or wanting no more than a few minutes out in a beautiful area, all of us can find something to do on a trail. This plan recommends a variety of trail types in all areas of the city, so that everyone can easily get to and use a trail that appeals to them. This section lays the foundation for trail types to be built in Sugar Land. By adding a layer of consistency to trail development, a clear picture of what the entire system will be like in the future can be created, and everyone can work towards putting the pieces to that picture in place.

Trail Users

Trails should be designed to accommodate a variety of users. Activity on a trail lends a sense of safety and comfort to a trail, and encourages others who are not as active to use the trail. Users of trails will include:

Walkers seeking exercise and recreation – Typically relaxed walking along a pleasant corridor; may include senior citizens, mothers with children, or families. May occupy a significant portion of the trail due to walking side by side.

Joggers and runners – use trail corridors for exercise and activity. Higher speed may conflict with slower users of the trails. Softer trail surfaces such as decomposed granite are preferred.

Recreational and inexperienced cyclists – Use trails for exercise and activity, are interested in scenic appeal and connectivity of the trail system, and prefer more interesting trail alignments, rather than trails that favor higher speeds. This group may also include children and youth going to school.

Higher speed cyclists and commuters – More experienced riders are typically more interested in higher speeds. These riders often favor roadways over off-street trails. For off-street trails, alignments with shallower curves are favored by these users. Because of the higher speeds, increased trail widths are recommended to reduce conflicts with other trail users.

Mountain biking – Users can travel on crushed rock or more natural trail surfaces, and preferred trails with challenging terrain.

In-line skaters - due to the swinging motion of their arms to increase momentum, skaters occupy a large cross section of a trail.

Categories of Trails for Sugar Land

Sugar Land has many unique opportunities for trails in all parts of the city. Within each of these opportunity areas, specific types of trails can be developed. Trails in Sugar Land will encompass several key types of facilities, each with its own size and character requirements. Where feasible, trails should follow the standards established by the American Association of State Highway Transportation Officials (AASHTO). The recommended trail types are discussed in greater detail below and on the following pages.

Community Wide (Regional or Arterial) Trails

Community-wide are intended to provide access from one part of the city to another. In essence, these trails become the "spine" system for the city, providing an easy route to travel longer distances. The Ditch "H" corridor that runs north and south through the geographic center of Sugar Land is an excellent example of such a trail.

Community wide trails typically are a high priority, since they provide the connectivity between many different parts of the city. These trails are typically at least 10' in width, but in some cases may be up to 12' in width where a significant volume of users is anticipated. In Sugar Land, arterial trails should be constructed with concrete. A suggested option is to provide a soft surface running trail along one side of the concrete trail.

Neighborhood Trails

Neighborhood trails mimic the system of local neighborhood streets which ultimately connect to larger boulevards. The neighborhood trails provide access from each neighborhood to the larger "arterial" trails. Neighborhood trails are typically only 6' to 10' in width, and should be constructed with concrete for long range durability. Tighter curves are allowed to introduce interest into the trail segments.

As in the case of arterial trails, some neighborhood trails can have a crushed granite component for runners directly adjacent to the concrete trail; if no danger of excessive flooding occurs, neighborhood trails may also be built out of decomposed granite.

Natural Trails

Two natural trail types occur in Sugar Land.

Forested River Corridor Natural Trails - the first type of natural trail occurs in the Brazos River corridor, and will consist of blazed trails through the forested areas along both banks of the river. These nature trails should be at least 8 to 10' in width, but in some cases may be 12 to 15' in width to allow for greater visibility within the understory. The trail surface will be compacted earth, and normal obstructions such as roots, rocks and understory vegetation should be cleared from the walking pathway. An additional 2 to 4' shoulder zone is desired on either side. Bridges and drainage crossings should be constructed using wood and timber materials, and should be rustic in appearance. All facilities along the Brazos corridor should be designed and built to withstand major flood impacts and fast moving water.

Greenway corridor natural trails – natural corridors exist along some of the levee corridors in the City. Portions of the Avalon and Commonwealth levee corridors are heavily canopied and create scenic corridors with overhanging trees. In some cases, these corridors may be used as walking trails, but with only minimal improvements to address street crossings. The gravel or turf surface of the trail along the top of the levee creates an atmosphere that is compatible with the natural beauty of the corridor, resulting in a very pleasant trail environment.

"Parkway" Trails and Sidewalks

Parkway trails - Often times the best trail corridors are adjacent to major collector or boulevard streets. Unlike sidewalks, these trails are wider, at a minimum width of 6' but 8' wide is preferred, are constructed with concrete, and usually include amenities such as decorative light fixtures, landscaping and ground cover and varying surface treatments at intersections and crosswalks. The overall parkway width should be at least 15 to 20' in width, to allow for at least 6' of clearance between the street curb and the walkway and another 4' +/- between the walkway and the adjacent property line. In many cases additional width may be required to accommodate drainage or other utilities.

The walk along the west parkway of Eldridge Road is an excellent example of a parkway trail. A parkway trail is recommended along the west right of way of Dulles Road north of Highway 6.

Sidewalks

Sidewalks – where sidewalk connections are recommended in this plan, walkways that are a minimum of 5' wide are recommended. Also, where feasible, along major roadways have a pedestrian running trail along one side of the concrete trail.

Other Specialized Types of Trails

Water Trails – the Brazos River creates an excellent opportunity for unique water trails that can become an added attraction in Sugar Land. For many, a casual one to two hour trip in a canoe is adequate, and it allows a much different perspective of the river. These water trails require boat ramps or landings, as well as parking for trailors and vehicles. Signs can be placed along the river to note special locations.

Equestrian trails - the Brazos River also offers a great opportunity for lengthy trails for horseback riding. Locations to ride horses are rare so close to a major city,, and offer an opportunity for a unique recreational venue in Sugar Land. Equestrian trails require additional clearance and a separate initial quarter mile trail for horse droppings. Parking for trailors is required, and a close in permanent stabling operation greatly increases the use of these trails.

Bicycle Facilities

Off street trails that are intended to accomodate bicycles are referred to as shared use paths. Most trails in Sugar Land should be designed to readily accomodate bicycles.

On-street bicycle facilities are equally important. Neighborhood routes should be identified that permit relatively easy riding. Specific facilities for cyclists include striped bicycle lanes that are a minimum 4' (5' is preferred for inexperienced rider comfort) in width from the street edge of the gutter pan, or in some cases the use of the "sharrow" which indicates a shared use lane. The sharrow is in the final stages of approval for inclusion in the Manual of Uniform Traffic Control Devices (MUTCD), but municipalities may apply for permission to use this new symbol prior to its formal adoption.

Trails Along Roadways can potentially become one of the most important trail types in Sugar Land.

Trail Type Standards

Neighborhood Trails (Off Street)

•Recommended minimum width	6’ to 10’ width (8’ preferred)
•Surface	Concrete, asphalt, crushed granite (Concrete typical)
•Access points	From neighborhod streets, parks, or schools
•Minimum corridor width	20’ width

Major Community-Wide Trails

•Recommended minimum width	10’ width minimum, 12’ for key corridors
•Surface	Concrete or asphalt (Concrete preferred)
•Access points	Every ¼ to ½ mile (Minimum ½ mile walk or ride to access point)
•Minimum corridor width	Varies – 50’ width minimum
•Other facilities	parking, locater maps, water fountains, shade shelters, bicycle racks, interpretive/historic signage

Regional Trails

•Recommended minimum width	12’ width
•Surface	Concrete
•Access points	Every 1 mile (Minimum ½ mile walk or ride to access point)
•Minimum corridor width	Varies - 50’ width
•Other facilities	parking, locator maps, water fountains, shade shelters, bicycle racks, interpretive/historic signage

Parkway Trails (Adjacent to Streets)

•Recommended minimum width	6’ to 8’ width (8’ preferred)
•Surface	Concrete, crushed granite (Concrete typical)
•Access points	Adjacent to major arterials and collector streets, parks,
•Minimum corridor width	15’ width (6’ from back of curb,1’ to property line

Sidewalks

Trail Design Standards

Trail and sidewalk width matters. Many of the existing sidewalks and trails in Sugar Land are very well placed, but do not create a user friendly place to walk simply because they are too narrow. The pictures below illustrate examples of narrow walkways in Sugar Land.

Trails should be designed to conform to standards recommended by the American Association of State Highway and Transportation Officials (AASHTO). These standards have been developed and refined over a significant period of time, and offer the most comprehensive safety standards. In some specific cases, variations from AASHTO may be acceptable to respect the character or special conditions of an area. Illustrations that follow indicate typical preferred trail section characteristics and clearances.

Figure D-1 illustrates a typical shared use path design that is appropriate for arterial trails. This trail is designed to accommodate two-way bicycle and pedestrian traffic, typically has its own right-of-way, and can accommodate maintenance and emergency vehicles. This type of trail is typically paved (asphalt or concrete) but can also be a surface that provides a smooth surface, as long as it meets ADA requirements. Wider soft shoulders can be provided for equestrians and runners / joggers if space allows. While vegetation is encouraged to enhance the trail experience, complete blocking out of the trail by vegetation from neighborhood view is discouraged. This results in a “tunnel” effect on the trail, creating the impression of decreased safety.

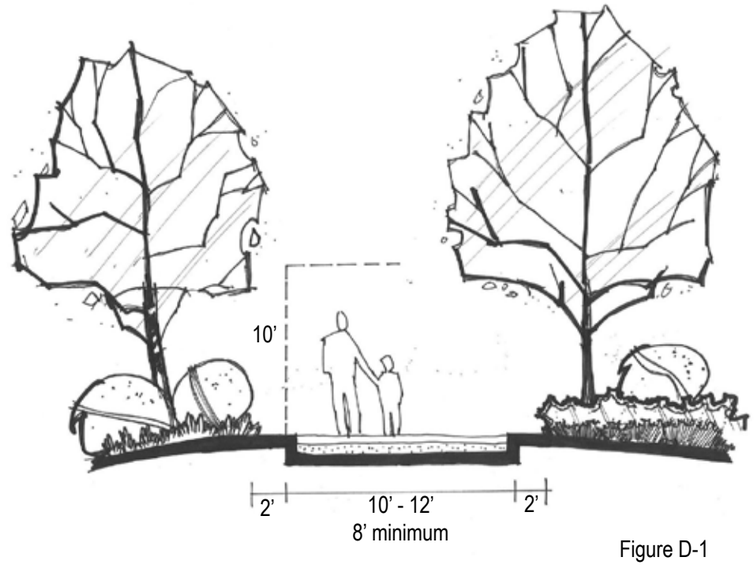

Figure D-1

Community Trail in Sensitive Areas

For community trails that will be located in environmentally sensitive areas, as shown in Figure D-2 and D-3, several measures are recommended to lessen the impact of the trail and trail users on the area:

- The riparian setback should be as wide as possible: 30-50' recommended
- Slope the trail away from the waterway or pre-treat trail run-off with a trailside swale
- Limit vegetation removal
- Locate the trail outside the 100-year floodplain wherever possible
- Remove invasive plant species
- Use the trail as an opportunity to restore and enhance the waterway or environmentally sensitive area.

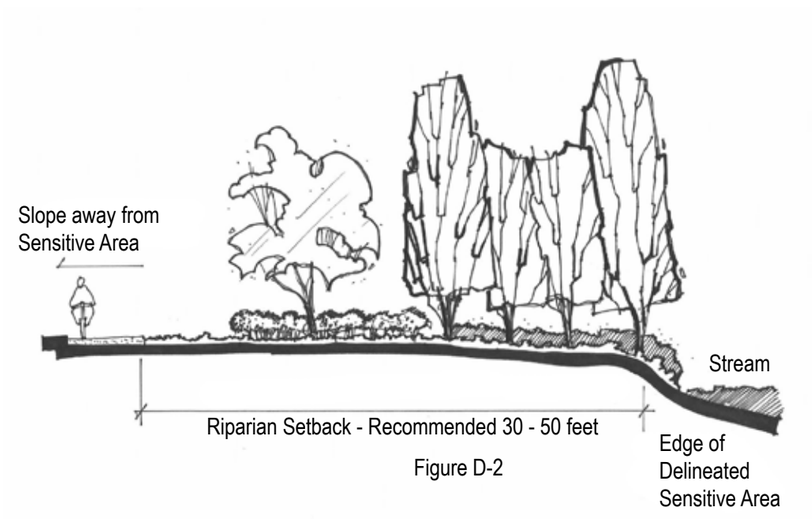

Figure D-2

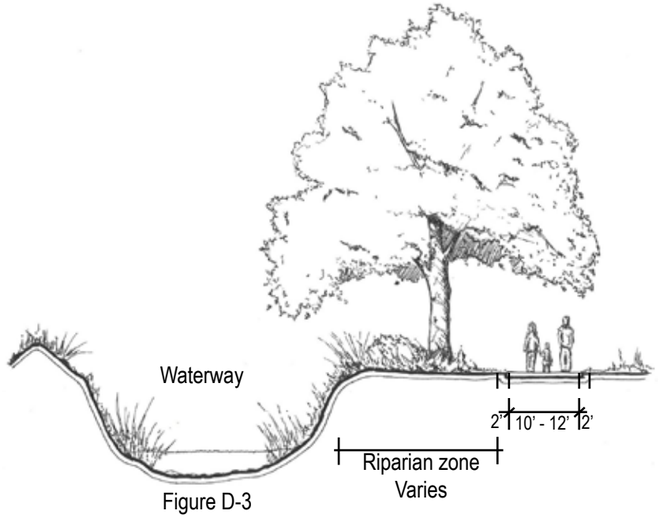

Figure D-3

Community Trail with Accommodation for Runners and Joggers

For community trails designed to accommodate runners and joggers, as well as other users, as shown in Figure D-4, several measures are recommended to ensure a quality trail experience for both runners and other community trail users:

- The hard surface community trail still needs to be designed to the standards of a community trail with no adjacent runner's trail with 10'-12' preferred widths and 10' vertical clearance
- This plan recommends decomposed granite trails along the relatively wide utility easements in order to locate them along – yet, at a distance away, from - the community trails.
- This type of trail is not recommended in sensitive stream corridors.

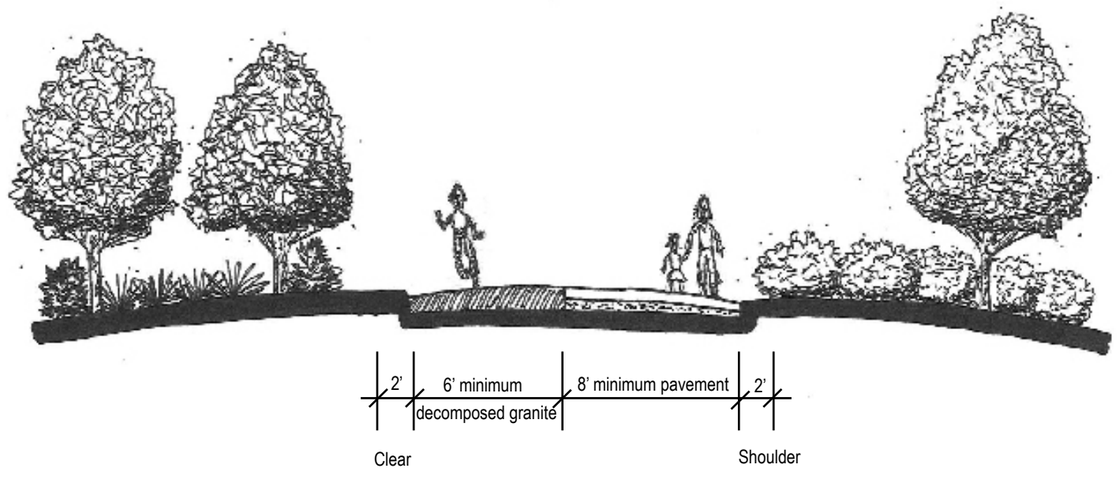

Figure D-4
Option for Combined Soft Surface
and All Weather Surface

Street Enhancements

Figure D-5 illustrates a typical enhanced street design that is appropriate for trails along roadways and thoroughfares in Sugar Land. These trails are adjacent to the roadway, and the setback from the roadway should be based on the classification of the adjacent roadway, as shown in Table 1. This type of trail is recommended along all scenic roads in Sugar Land.

Table D - 1 Setback Recommendations	
Roadway Classification	**Recommended Minimum Trail Setback**
Residential	**Minimum 2 Feet without Trees**
Collector	**Fifteen Feet**
Arterials and Highways	**Twenty-five Feet**

Street enhancements should be avoided on roadways with multiple intersections or driveways, as each intersection or driveway creates a conflict point between trail users and motor vehicles. Street enhancements are designed to create connections between foot trails and the community trails, as well as to connect popular destinations throughout Sugar Land. Sidewalks less than 8' wide by themselves should be avoided as designated trails wherever possible.

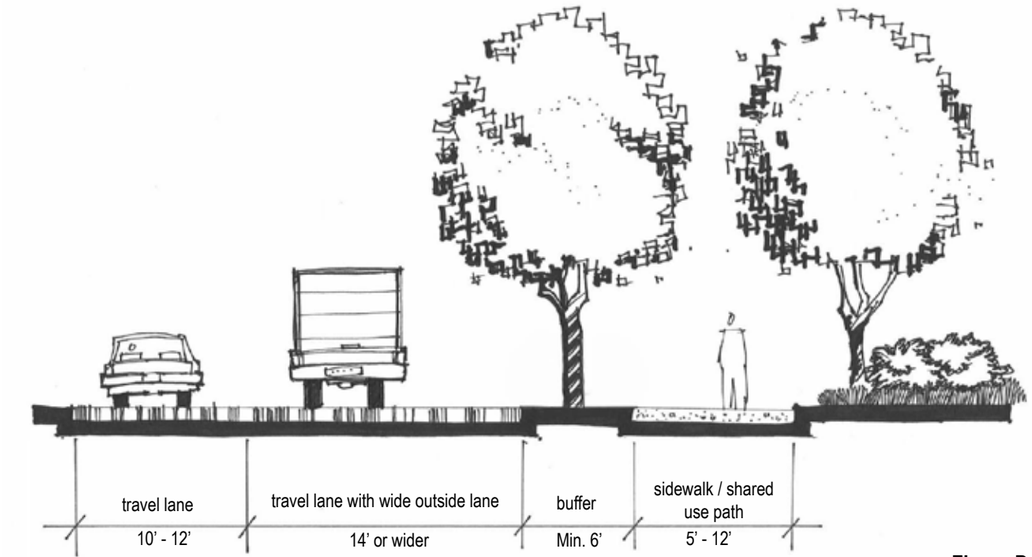

Figure D-5

Bridges

Typical pedestrian bridge in Sugar Land

Pedestrian bridges are required in two locations. One is for typical drainage channel crossings that span anywhere from 50 to 200'. These bridges may be typical pre-fabricated designs, but should always strive to be a step above the customary steel bridge design.

The second location, at the Brazos River and at the southern extension of the Oyster Creek trail along the fringes of the Power Line corridor, signature bridge features should be incorporated. Highway 6 is the gateway into Sugar Land from Missouri City, and the bridge creates an immediate opportunity to announce the transition from one city to the next.

From a user's perspective, bridges should be at least as wide as the trail; preferably one to two feet wider on each side. This is so pedestrians can stop and view the adjacent scenery without obstructing the trail. Any bridge that is specifically designated for bicycle traffic must have appropriate railing for bicyclists. Texas has adopted the AASHTO Bridge Design Specifications requirement that railing of bridges that are designated for bicycle traffic should be a minimum of 54 inches high with the same restrictions on openings as for pedestrian railing. Pedestrian railing openings between horizontal or vertical members must be small enough that a 4-inch sphere cannot pass through them in the lower 27 inches. For the portion of pedestrian railing that is higher than 27 inches, openings may be spaced such that an 8-inch sphere cannot pass through them. Decking material should be firm and stable. Bridge approaches and span should not exceed 5% slope for ADA access.

Bridges should accommodate maintenance vehicles if necessary. Bridge structures should be out of the 100-year floodplain. Footings should be located on the outside of the stream channel at the top of the stream bank. The bridge should not constrict the floodway. All bridges and footings in the stream corridor will need to be designed by a registered geotechnical or structural engineer. Cost, design and environmental compatibility will dictate which structure is best for the trail corridor.

Underpasses

Underpasses provide a more direct route to go under a busy street. From the standpoint of a user, underpasses should be well lighted and attractive, and most of all project a sense of security. All vehicular bridges added in Sugar Land in the future should be designed to accommodate a "shelf" for a trail. Attractive examples of underpasses can be found in the Telfair and Greatwood developments.

Examples of unique pedestrian bridges including Central Park in New York and the Telfair development in Sugar Land.

Trail Access Points and Trailheads

A very high level of accessibility is desired for municipal trail corridors. More access points increase a sense of security, since they encourage ready use of the trail by area residents. A well used trail will most likely be at parks. Access points should be as little as 1/8th of a mile apart for neighborhood trails, and typically no more than a 1/4 mile to a 1/2 mile for all other trail types. Two types of neighborhood trail access points include:

Access from adjacent neighborhood streets

Access from specific trailheads in parks

Typical facilities for trailheads include the following:

Typical Trailhead

Includes:

- parking for 10+/- cars
- Small Shade Pavilion
- Drinking Fountain
- Optional Safety Call Box
- Kiosk with Trail Map and Information
- Bicycle Parking Stand
- Optional Fitness Stations or Warm-Up Stations
- Landscaping and Optional Seasonal Color
- Major Trail Identification Sign
- Optional restrooms (in park locations)

Typical Trailhead layout, including parking, entry features, identifcaiton sighs and map information.

Other Trail Features

In order for the trails system to be a successful community amenity, the trails should appeal to a wide variety of users. To achieve this, the trails should be designed to provide a high level of user conveniences. The demographics of the community include both elderly and young users. These groups will use the trail more often if amenities are provided. Recommended trail amenities include:

- Benches: Utilize wood composites with metal detailing.
- Bike racks: Staple racks are inexpensive and most effective
- Milepost markers: Mileposts greatly increase use of the trail by joggers and cyclists looking for set workout distances. It is recommended to incorporate milepost markers onto fixed wood or concrete bollards. Signage should be consistent with other trail signage. 1/4 mile and 1/2 mile increments can be used to add further interest.
- Trash receptacles: The trail should establish the National Park Service ethic of "pack it in, pack it out." Periodic containers at access points should be provided.
- Dog Waste Pickup Stations: Dog waste pickup bag dispensers should be placed at trailheads and key neighborhood access points along the route. Signs should be placed along the trail notifying dog owners to pick up after their dogs.
- Information Kiosks: Trailhead stations should provide trail users with information and the rules and regulations of the trail. Involving school children, university students and civic organizations in the research, design, and construction of these kiosks would be an excellent community activity.
- Directional Signage: The directional signing should impart a unique theme so trail users know which trail they are following and where it goes. The theme can be conveyed in a variety of ways: engraved stone, medallions, bollards, and mile markers. A central information installation at trailheads and major crossroads also helps users find their way and acknowledge the rules of the trail. They are also useful for interpretive education about plant and animal life, ecosystems, and local history.
- Restrooms: Where appropriate at major trailheads.

Materials used for amenities should receive approval from the City of Sugar Land. For recycling and maintenance purposes, the cities should use wood composite materials for amenities where wood is specified; wood composites have the aesthetic qualities of wood, but are better for park amenities.

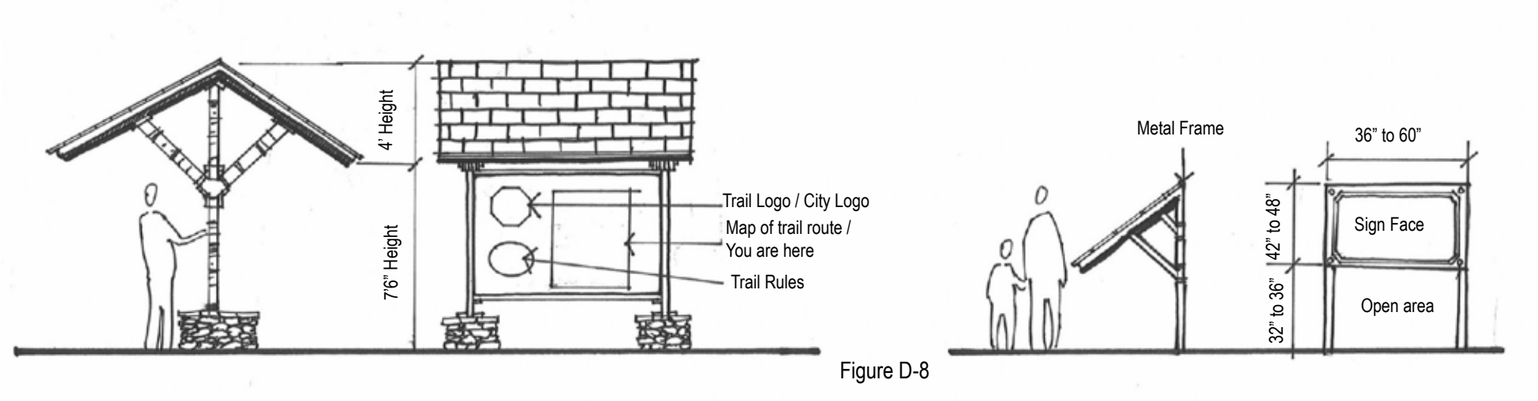

Figure D-8

Water Fountains and Bicycle Parking

Water fountains provide water for people (and pets, in some cases) and bicycle racks allow trail users to safely park their bikes if they wish to stop along the way, particularly at parks and other desirable destinations.

Interpretive Installations

Interpretive installations and signs can enhance the trail experience by providing information about the history of Sugar Land. Installations can also discuss local ecology, environmental concerns, and other educational information.

Pedestrian-Scale Lighting and Furniture

Pedestrian-scale lighting improves safety and enables the trail to be used year-round. It also enhances the aesthetic beauty of the trail. Lighting fixtures should be consistent with other light fixtures in the city, possibly emulating a historic theme.

Providing benches at key rest areas and viewpoints encourages people of all ages to use the trail by ensuring that they have a place to rest along the way. Benches can be simple (e.g., wood slats) or more ornate (e.g., stone, wrought iron, concrete).

Art Installations

Local artists can be commissioned to provide art for the trail system, making it uniquely distinct. Many trail art installations are functional as well as aesthetic, as they may provide places to sit and play on.

Maps and Signage

A comprehensive signing system makes a trail system stand out. Informational kiosks with maps at trailheads and other pedestrian generators can provide enough information for someone to use the trail system with little introduction – perfect for areas with high out-of-area visitation rates as well as the local citizens.

Typical Trail Type Costs - Typical trail costs vary based on the type of material used for the trail, the number of bridges or drainage crossings that are required, and the types of amenities that are included in each trail segment. Cost projections for a typical one mile length of trail, using different materials are shown on the following pages. Each projection also includes a contingency amount, since all trails in this plan are at a pre-design stage. Projections also include an allowance for surveying, design and construction administration associated with the design of each trail. These costs are the basis for segment cost estimates shown in Section F.

Summary - Trail Cost per Linear Foot	
10 to 12' wide community wide trail - concrete	$150 to $175 per linear foot
8' wide neighborhood trail - concrete	$125 to $140 per linear foot
8' wide parkway trail - concrete	$110 to $135 per linear foot
6' wide sidewalk	$80 to $90 per linear foot
8' wide decomposed granite trail	
8' wide nature trail	$65 to $110 per linear foot

Arterial Concrete Trail - 10' width

Potential Development Cost

Description - Planned as major trail connecting sectors of the city. 10' wide concrete all weather trail, centerline stripe, straight to curvilinear alignment as corridor permits. 4 to 6" thick concrete to allow for some use as maintenance track. Includes some amenities at key intersection or access point nodes. Additional amenities such as shade structures and benches can be added in the future.

	Item	Quantity	Unit	Unit Price	Amount
Base Cost					
1	Grading Allowance (per linear foot)	5,280	LF	$12	$ 63,360
2	Concrete Trail, 4 to 6 inch depth, 10' width, includes base material	5,280	LF	$75	$ 396,000
3	Trail Striping	5,280	LF	$4	$ 21,120
4	Culverts (12" diam. Max. for local drainage only). Allowance for one every 250 linear feet	21	EA	$1,000	$ 21,000
5	Major drainage culverts (36" to 48" box culvert, assume one every 2000 linear feet)	3	EA	$20,000	$ 60,000
6	Trail directional/safety signs (assume 1 every 500 linear feet)	10	EA	$500	$ 5,000
7	Intersection crosswalk striping	4	EA	$1,000	$ 4,000
8	Intersection and access point accessible ramps (assumes 4 at every intersection)	8	EA	$1,000	$ 8,000
9	Turf re-establishement (allowance for 5' on either side of trail corridor)	52,800	SF	$0.5	$ 26,400
Subtotal					**$ 604,880**
Amenity Cost					
10	Drinking fountain (one per mile)	1	EA	$5,000	$ 5,000
11	Information kiosk (assume ratio of one per mile)	1	EA	$5,000	$ 5,000
12	Major trail access point sign (1 every 2500 linear feet)	2	EA	$3,000	$ 6,000
13	Security lighting at access point (1 pole per access point)	4	EA	$2,500	$ 10,000
14	Emergency Callbox (one per half mile)	2	EA	$15,000.0	$ 30,000
Subtotal					**$ 56,000**
Subtotal Construction Cost					$ 660,880
Design, Testing, Administration,Misc. Costs (15%)					$ 99,132
Contingency at Pre-Design Level (20%)					$ 152,002
Total					**$ 912,014**
Estimated Cost per Linear Foot					**$ 173**
Estimated Base Cost per Linear Foot					**$ 158**

Note: *Order of Magnitude Estimate only, without detailed design.*
This estimate is intended only to establish a range of potential costs for this construction effort.
Costs shown are in 2007 dollars.

Typical 10' to 12' wide major trail, the heart of the trail system

Typical 8' wide neighborhood trail meandering through a utility corridor

Neighborhood Concrete Trail - 8' width

Potential Development Cost

Description - Planned as neighborhood trail segments connecting to major arterial trails. 8' wide concrete all weather trail, centerline stripe, straight to curvilinear alignment as corridor permits. 4 to 6" thick concrete to allow for some use as maintenance track. Includes some amenities at key intersection or access point nodes. Additional amenities such as shade structures and benches can be added in future.

	Item	Quantity	Unit	Unit Price	Amount
Base Cost					
1	Grading Allowance (per linear foot)	5,280	LF	$9	$ 47,520
2	Concrete Trail, 4 to 6 inch depth, 8' width, includes base material	5,280	LF	$65	$ 343,200
3	Trail Striping	5,280	LF	$4	$ 21,120
4	Culverts (12" diam. Max. for local drainage only). Allowance for one every 250 linear feet	21	EA	$1,000	$ 21,000
5	Major drainage culverts (36" to 48" box culvert, assume two every 5000 linear feet)	2	EA	$20,000	$ 40,000
6	Trail directional/safety signs (assume 1 every 500 linear feet)	10	EA	$500	$ 5,000
7	Intersection crosswalk striping	4	EA	$1,000	$ 4,000
8	Intersection and access point accessible ramps (assumes 8 at every intersection)	8	EA	$1,000	$ 8,000
9	Turf re-establishment (allowance for 5' on either side of trail corridor)	52800	SF	$0.5	$ 26,400
Subtotal					**$ 516,240**
Amenity Cost					
10	Drinking fountain (one per mile)	1	EA	$5,000	$ 5,000
11	Information kiosk (assume ratio of one per mile)	1	EA	$5,000	$ 5,000
12	Major trail access point sign (1 every 2500 linear feet)	2	EA	$3,000	$ 6,000
13	Security lighting at access point (1 pole per access point)	4	EA	$5,000	$ 20,000
14	Bench node (2 per every mile, includes bench, trash receptacle, decorative pavement)	2	EA	$3,000	$ 6,000
Subtotal					**$ 42,000**
Subtotal Construction Cost					$ 558,240
Design, Testing, Administration, Misc. Costs (15%)					$ 83,736
Contingency at Pre-Design Level (20%)					$ 128,395
Total					**$ 770,371**
Estimated Overall Cost per Linear Foot					**$ 146**
Estimated Base Cost per Linear Foot					**$ 135**

Note: *Order of Magnitude Estimate only, without detailed design.*
This estimate is intended only to establish a range of potential costs for this construction effort.
Costs shown are in 2007 dollars.

Parkway Trail - 8' Width

Potential Development Cost per Mile

Description - straight to semi-curved alignment where possible, constructed adjacent to major boulevards, 8' width, 4"+ thickness. Because these trails are in highly visible locations, they must include landscaping and decorative features such as benches, groundcover, and signs at key node areas.

	Item	Quantity	Unit	Unit Price		Amount
Base Cost						
1	Grading Allowance (per linear foot - assumes 0.5 ft depth fine grading under trail to generate allowance amount)	5,280	LF	$3	$	15,840
2	Concrete Sidewalk, 4 to 6 inch depth, 8' width, includes base material	5,280	LF	$65	$	343,200
3	Trail Striping (not required for this type of trail)	0	LF	$4	$	-
4	Culverts (12" diam. Max. for local drainage only). Non required for this type of trail	21	EA	$1,000	$	21,000
5	Major drainage culverts (36" to 48" box culvert, assume one every 2000 linear feet)	0	EA	$20,000	$	-
6	Trail directional/safety signs (assume 1 every 500 linear feet)	10	EA	$500	$	5,000
7	Intersection crosswalk striping	4	EA	$3,000	$	12,000
8	Intersection and access point accessible ramps (assumes 8 at every intersection)	8	EA	$1,500	$	12,000
	Turf re-establishment (vaires, allowance of 8 square feet for every linear foot)	40,000	SF	$0.5	$	20,000
Subtotal					**$**	**429,040**
Amenity Cost						
9	Landscape Allowance	5,280	LF	$10	$	52,800
10	Benches (8 per mile)	8	LF	$1,200	$	9,600
11	Drinking fountain (one per mile) - non provided with this type of trail	0	EA	$5,000	$	-
12	Information kiosk (assume ratio of one per mile)	1	EA	$5,000	$	5,000
13	Major trail access point sign (1 every 2500 linear feet)	2	EA	$3,000	$	6,000
14	Security lighting at access point (1 pole per access point) - assumed to be already in place along streets	0	EA	$2,500	$	-
Subtotal					**$**	**73,400**
Subtotal Construction Cost					$	502,440
Design, Testing, Administration,Misc. Costs (15%)					$	75,366
Contingency at Pre-Design Level (20%)					$	115,561
Total					**$**	**693,367**
Estimated Cost per Linear Foot					**$**	**131**
Estimated Base Cost per Linear Foot					**$**	**112**

Note: *Order of Magnitude Estimate only, without detailed design.*
This estimate is intended only to establish a range of potential costs for this construction effort.
Costs shown are in 2007 dollars.

Typical 8' wide parkway trail in an attractive landscaped setting

Typical sidewalk with setback from adjacent roadway

Sidewalk - 6' Width

Potential Development Cost

Description - Major sidewalk connection through neighborhoods and commercial areas.

	Item	Quantity	Unit	Unit Price		Amount
Base Cost						
1	Grading Allowance (per linear foot)	5,280	LF	$9	$	47,520
2	Concrete Trail, 4 to 6 inch depth, 8' width, includes base material	5,280	LF	$50	$	264,000
3	Trail Striping	0	LF	$4	$	-
4	Culverts (12" diam. Max. for local drainage only). Allowance for one every 250 linear feet	0	EA	$1,000	$	-
5	Major drainage culverts (36" to 48" box culvert, assume two every 5000 linear feet)	0	EA	$20,000	$	-
6	Trail directional/safety signs (assume 1 every 500 linear feet)	0	EA	$500	$	-
7	Intersection crosswalk striping	0	EA	$1,000	$	-
8	Intersection and access point accessible ramps (assumes 8 at every intersection)	0	EA	$1,000	$	-
9	Turf re-establishment (allowance for 5' on either side of trail corridor)	52800	SF	$0.5	$	26,400
Subtotal					**$**	**337,920**
Amenity Cost						
10	Drinking fountain (one per mile)	0	EA	$5,000	$	-
11	Information kiosk (assume ratio of one per mile)	0	EA	$5,000	$	-
12	Major trail access point sign (1 every 2500 linear feet)	0	EA	$3,000	$	-
13	Security lighting at access point (1 pole per access point)	0	EA	$5,000	$	-
14	Bench node (2 per every mile, includes bench, trash receptacle, decorative pavement)	0	EA	$3,000	$	-
Subtotal					**$**	**-**
Subtotal Construction Cost					$	337,920
Design, Testing, Administration, Misc. Costs (15%)					$	50,688
Contingency at Pre-Design Level (20%)					$	77,722
Total					**$**	**466,330**
Estimated Overall Cost per Linear Foot					**$**	**88**
Estimated Base Cost per Linear Foot					**$**	**88**

Note: *Order of Magnitude Estimate only, without detailed design.*
This estimate is intended only to establish a range of potential costs for this construction effort.
Costs shown are in 2007 dollars.

Nature Trail - 8' Width

Potential Development Cost per Mile

Description - natural surface trail through river corridor and along some levee corridors. Includes concrete landings and allowance for some fully accessible areas. Includes small bridges to cross drainage swales, and one major bridge per every three miles.

	Item	Quantity	Unit	Unit Price	Amount
Base Cost					
1	Minor Grading Allowance (per linear foot - assumes 0.5 ft depth fine grading under trail to generate allowance amount)	5,280	LF	$3	$ 15,840
2	Concrete Sidewalk, 4 to 6 inch depth, 8' width, includes base material	520	LF	$65	$ 33,800
3	Natural trail - includes clearing of 15 to 20' wide corridor, fine grading, construction of some steps to improve access	5,000	LF	$15	$ 75,000
4	Trail Striping (not required for this type of trail)	0	LF	$4	$ -
5	Culverts (12" diam. Max. for local drainage only). Maximum of 10 per mile assumed	10	EA	$1,500	$ 15,000
6	Major drainage culverts or small bridges (36" to 48" box culvert, assume one every 2000 linear feet)	2.5	EA	$25,000	$ 62,500
7	Major pedestrian bridge - assumes one every three miles	0.33	EA	$150,000	$ 49,500
8	Trail directional/safety signs (assume 1 every 1,000 linear feet)	5	EA	$500	$ 2,500
9	Intersection and access point accessible ramps (assumes 1 per access point, two total access points per mile)	2	EA	$1,500	$ 3,000
10	Turf re-establishment (none provided for this type of trail, allow for natural vegetative re-establishment)	-	SF	$0.5	$ -
Subtotal					**$ 257,140**
Amenity Cost					
11	Landscape Allowance at entrances	5280	LF	$8	$ 39,600
12	Bench nodes (4 per mile, includes stone benches, table, flagstones set in concrete, seating wall)	4	EA	$15,000	$ 60,000
13	Drinking fountain (one per entrance area)	1	EA	$5,000	$ 5,000
14	Information kiosk (assume ratio of one per mile)	1	EA	$10,000	$ 10,000
15	Major trail access point sign (1 every 5,000 linear feet)	1	EA	$5,000	$ 5,000
16	Emergency Call box - solar powered, one per 1/2 mile	2	EA	$15,000	$ 30,000
17	Security lighting at access point (1 pole per access point)	1	EA	$5,000	$ 5,000
Subtotal					**$ 154,600**
Subtotal Construction Cost					$ 411,740
Design, Testing, Administration, Misc. Costs (15%)					$ 61,761
Contingency at Pre-Design Level (20%)					$ 94,700
Total					**$ 568,201**
Estimated Cost per Linear Foot					**$ 108**
Estimated Base Cost per Linear Foot					**$ 67**

Note: *Order of Magnitude Estimate only, without detailed design.*
This estimate is intended only to establish a range of potential costs for this construction effort.
Costs shown are in 2007 dollars.

A Target Level of Service for Trails in Sugar Land

The 2004 Citywide Parks and Recreation Master Plan prepared for Sugar Land recommended that the city adopt a target level of service of one mile of trail for every 4,000 residents of the City. In light of the increased interest in trails, the high level of citizen interest, and the commitment to quality of life that trails represent, this plan confirms that recommended target goal of The Parks and Recreation Master Plan.

The target level of service should be viewed as a performance guide and a device to measure progress over the previous year. It should not be viewed as the absolute final goal of the city, since over time the city may actually exceed that target level of service.

The table on this page illustrates the amount of trails that would be constructed with the proposed trail level of service target, and other less aggressive levels of service for comparison.

Great trails quickly become the heart and image of a community.

Potential Trail System Target Citywide Level of Service

Sugar Land Population from 2000 Census	**63,328**
Year 2007 Population (estimated)	**76,228**
Total Current Miles of Trails in Sugar Land (excluding looped trails in parks)	**5.5 miles**
Existing Ratio of Trails	**1 mile per every 13,860 residents**
Total Current Miles of Trails in Sugar Land (including looped trails in parks)	**10.5 miles**
Existing Ratio of Trails	**1 mile per every 7,260 residents**

Major Citywide Trail Mileage Target Levels of Service

For the Current Year 2007 (current estimated population of 76,228)

- Goal @ 1 mile per 4,000 residents — 19.1 miles (deficit of 13.6 miles)
- Goal @ 1 mile per 7,500 residents — 10.2 miles (deficit of 4.7 miles)
- Goal @ 1 mile per 10,000 residents — 7.6 miles (deficit of 2.1 miles)

Year 2010 (with a projected population of 85,055)

- Goal @ 1 mile per 4,000 residents — 21.3 miles (deficit of 15.8 miles)
- Goal @ 1 mile per 7,500 residents — 11.3 miles (deficit of 5.8 miles)
- Goal @ 1 mile per 10,000 residents — 8.5 miles (deficit of 3 miles)

Year 2020 (with a projected population of 91,543)

- Goal @ 1 mile per 4,000 residents — 22.9 miles (deficit of 17.4 miles)
- Goal @ 1 mile per 7,500 residents — 12.2 miles (deficit of 6.7 miles)
- Goal @ 1 mile per 10,000 residents — 9.2 miles (deficit of 3.7 miles)

"In the nineteenth century we built the railroad system and in the twentieth century we built the highway system. In the 21st century we will reconnect America with a network of trails and greenways. My vision is to change the map of America."

DAVID BURWELL, President, Rails-to-Trails Conservancy, 2000